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A project was initiated in the Centennial School District, Warminster, Pennsylvania, to improve response-eliciting educational materials. Efforts were concentrated on developing environmental awareness, imagination, figure and ground discrimination, memory training, visual motor skills, and picture interpretation. Classes of primary and intermediate slow-learning children and kindergarten children tried out self-motivating materials. Film loops, overhead projection transparencies, light table transparencies, filmstrips, 2x2 slides, and visual puzzles were the means of the learning experience. Generally, a great deal of interest and discussion was provoked by the materials. A demonstration conference in Harrisburg (March 1966) planned basic, educational, personality, and special education research on these instructional media. It was concluded that educational experiences can be designed and materials produced which enable children to discover things for themselves and learn more actively. The project has received positive support from teachers of normal and slow-learning children. (TI)

FINAL REPORT

Project No. B-536

Contract No. OE 5-16-029

INSTRUCTIONAL MEDIA AND HEURISTIC LEARNING

February, 1967

U.S. DEPARTMENT OF

HEALTH, EDUCATION, AND WELFARE

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INSTRUCTIONAL MEDIA AND HEURISTIC LEARNING

Project No. B-536
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Dr. Henry W. Ray

December 1966

The research reported herein was performed pursuant to a contract with the Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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Centennial School District

Warminster, Pennsylvania

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INTRODUCTION

The Problem: To develop and try out response-eliciting materials

Most materials used in elementary education are materials "to be learned". Such materials do not stimulate curiosity; do not provoke divergent thinking; do not stimulate creative behavior; do not provide opportunities to "discover" the world. The curriculum is "information to be memorized" and little opportunity is given the child to develop his intellect, to reflect, to discuss, or to discover.

For several years the project director sought ways to make education more than a memorization process. During these years a variety of slides and a few motion pictures were made which were response-eliciting in nature. Some related paper-pencil experiences were designed. All of these materials were enjoyed by children. They presented a different type of learning experience for the child. These materials were not duplications of existing audio-visual commercial materials, most of which are also centered on giving information. The materials were unique as stimulators of imagination, as environmental exploration materials, and other human abilities such as visual perception.

During the early months of 1964, Dr. N. Sidney Archer of the Department of Public Instruction for Pennsylvania, became acquainted with the materials and suggested we apply to the United States Office of Education for support in further development and tryout of the ideas. Dr. Archer arranged for a demonstration which was held in the audio-visual center at the United States Office of Education in Washington, D. C. The demonstration was well attended by members of the U. S. Office of Education. A few months later a contract was received which made possible the employment of some personnel, the employment of consultants, and some funds for creating and duplicating materials. Efforts were concentrated on the following categories of child growth and development.

1. developing environmental awareness
2. stimulating the imagination
3. developing figure and ground discrimination
4. memory training
5. developing visual motor skills
6. learning to see

Materials were tried out with two classrooms of primary level slow learning children, an intermediate grade level classroom of slow learning children, a kindergarten, most of whose students resided in an economically deprived housing area, and a nursery school project in the same economically deprived area. - Later, as Head Start Programs were started in the school district, the materials were extended in use to include these groups. Individual materials often covered more than one of the six categories listed above. There were other learnings such as curiosity arousal and problem solving skills which were not specifically planned for in preparing the materials.

DEVELOPING ENVIRONMENTAL AWARENESS

Standard 35 millimeter slides and short 8 millimeter motion pictures were the principal materials used for developing environmental awareness. Our plan was to prepare sets of approximately twenty slides for individual presentations. These slide sets were not thematic in nature -- that is, they were not twenty slides about a farm or about a city or about community workers. The sets had wide variety of content. A single set of slides might be programmed as follows:

1. clothes drying on an outdoor clothesline
2. a fire plug
3. an old wagon wheel
4. a fire scene
5. a barber shop pole
6. an abstract painting (Hoffman, Kandinsky etc.)
7. a kitten
8. an open field
9. an evening scene
10. clouds
11. a large zoo animal (elephant, zebra, etc.)
12. a leafless tree

13. a photo montage

14. a horse

15. a school bus

16. interior of a store

17. a piece of sculpture

18. a bird

19. a boat

20. a person or persons doing something

Such a set would require a presentation time of twenty to forty minutes. Few questions were asked by the presentor. Occasionally the projector lens was thrown out of focus between slides. The children would be questioned "What do you think this is?" The slide was very slowly brought into focus with many conjectures on the part of the children as to what the image content would eventually be. There was considerable animated behavior when the clear image became visible. The children never seemed to grow tired of having this technique used -- it made a game out of seeing and imagining.

Each slide generally provoked a great deal of discussion. Classroom teachers expressed surprise at the vocabulary the children possessed. Typical teaching materials do not provide for this release of language on the part of the child. Another point we become sensitive about was the interaction among the children in these situations -- children teaching other children -- children debating with other children -- children learning from other children -- children expressing or learning to express themselves in language.

It is worth noting that in one group the discussions were dominated by ten or twelve children. The remaining fifteen children sat silently as the others told what they saw, etc. The teacher requested that we try using the slides only with the non-discussing group of children for a while. This was done -- and within three or four weeks children who were only "lookers" and "listeners" became "talkers" as well.

Another technique which seemed to have considerable value as a curiosity stimulator was to reveal the slide very gradually. Perhaps only a quarter inch "slice" of the slide was exposed -- and discussion held as to what the content might be. Another quarter inch might then be revealed for more discussion, and finally the entire slide was exposed.

Sessions were often "spiced" with an 8mm film used in the Technicolor Cartridge Projector. After slide number 7 of the series tabulated above, if a film on cats were available it might be shown. These added a many dimensioned viewing of the slide content and varied the pace of the experience. The 8mm films were rarely used alone except as follow up experiences.

STIMULATING THE IMAGINATION

We assume that the children's power of imagination was stimulated in the slide series above -- particularly by numbers 6, 13, and 17. However, to the degree that imagination is coupled to experiences then the broad range of content they were exposed to probably contributed to the development of imagination. Many of the questions raised by the slides and the discussion during the period of presentation carried potential imagination stimulation. For example, the fire plug slide elicited discussion about what might be done if there were a fire and no fire plug near enough for the firemen to attach hoses. Or the wagon wheel -- why was it discarded? How had it been used? What would our community be like if there were no wheels? What toys would we be without? In all these and in practically every case, opportunities arose where the children's imaginations were stimulated and aroused.

The photo montages and slides of works of art evoked discussion which can only be described as imaginative in nature.

DEVELOPING FIGURE AND GROUND DISCRIMINATION

Two by two slides in which figure ground discrimination was the basic problem of the slide content were included at times in the classroom slide presentations. Such discrimination is often required in works of art. One of the self portraits by Matisse is done in such a way that the portrait is difficult to distinguish as a portrait -- one sees trees or foliage, rather than the face of a man -- until the mind forces the figure (foliage) to become ground and then the portrait becomes visible. A number of artists employ figure/ground relationships in such a way that the figure and ground shift in their relationship.

As part of this area of development a series of cattle drawings were made. The black and white areas of the cattle carried images within the spot patterns, produced by the black and white qualities of the hides. These images varied widely in complexity. The exercises were produced as overhead pro-

duced as overhead projection transparencies. In practice, the slides were projected and the children were invited to describe what they saw. Many children experienced difficulty at first. Number one of this series is a simple turtle shape in white. An overlay containing detailed drawing of the turtle shell, eyes, feet, etc. was used to help the children having difficulty with the image to grasp the concept. Two cow patterns were presented each week. In addition to the transparencies, paper copies were put on a bulletin board for further experiencing. Thus a small herd of unusual cattle took shape on the classroom bulletin board. The children enjoyed these and were soon finding images in other spots that had not been planned. Evidently their imagination too was stimulated by this experience.

MEMORY TRAINING

Progress toward meaningful memory training remains in a very crude state. We have developed several slide series in which the child sees a common object such as a cup. In succeeding slides the cup is gradually "concealed" by adding more lines until in the final design the cup is visible only if the memorization of its original shape or appearance has been maintained. The final design in some cases is available on paper. The children can draw or cut out the object. Incorrect responses can then be dealt with by showing the slide series again with perhaps some verbalization about details of the object -- carried on to the final slide and the paper pencil experience again given. Most of those making errors on the first try did perfect papers the second time. These experiences held the interest of the children very well.

It is worth noting that if a slide that had been used in one set and was added to a later set many children almost instantly recognized the repetition.

DEVELOPING VISUAL MOTOR SKILLS

The most unique resource for developing visual motor skills used in this project is a light table much like those used in graphic arts. The light table is simply a school desk-size stand with a translucent plastic or translucent plate glass top. Beneath the glass are florescent lights. Regular tungsten lights give off too much heat making the top too warm for comfortable working after a short time.

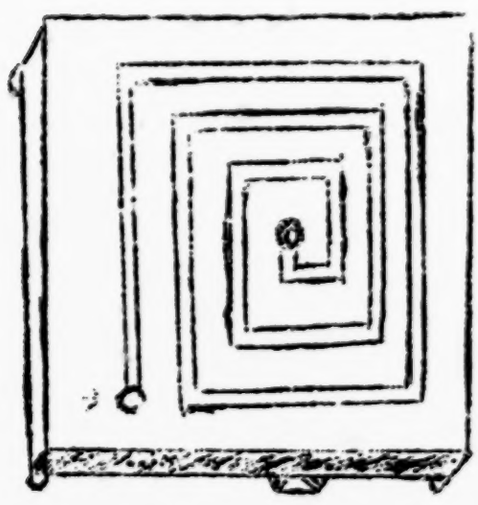
We created simple designs using "follow-the-dot" patterns.

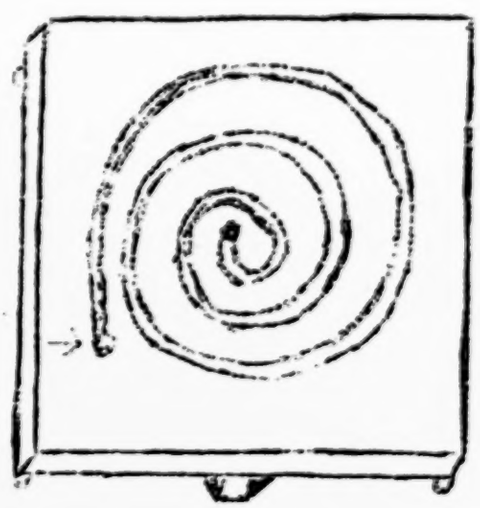
The designs were made on large sheets of photographic film. The dot pattern was created by dipping a brush in film developer and applying in a dot pattern on the film. The "dot" of liquid developer develops a black dot on the film. After the dot pattern is thus completed the remaining emulsion is cleared in regular hypo-fixer solution, washed and dried. After drying it is ready for use -- the black dots are permanent.

The pattern on film is taped to the light table and a sheet of unprinted news or other inexpensive paper is placed over the film and taped in place to keep it from sliding. The pattern shows through clearly. The child traces the design with a writing, drawing or marking instrument. The teachers are very enthusiastic about this resource and technique -- the children love to work at the light table and some develop almost unbelievable facility with their marking crayon or writing tool.

Besides designs, the technique and material can be used to help the child learn letter and number shapes, words, and his or her name. Words can be written on smaller pieces of cleared film or transparent plastic utilizing felt markers. However, the image lacks the contrast of the photochemical developed material and fades or rubs off.

Several form boards were conceived but only two of the designs were completed and given a tryout. The idea was to rout a channel in wood deep enough for a common marble to fit in the channel. The child would push the marble with a stick or his finger. At the center or end of the design the marble would drop through a hole and return to the child for re-play. The two designs completed were somewhat as follows:





Both boards were covered with sheet plastic with the routed designs repeated in the plastic, but narrower so as to retain the marble in the groove, yet permit pushing with a pencil. Future de-

signs, had they been completed, would have eliminated the plastic top sheet and required only the finger of the child for pushing the marble to the center target.

The boards were used with older (14 - 16 year) retarded children and with one group of pre-school children. The teacher of the retarded children felt it to be a valuable learning device for his group.

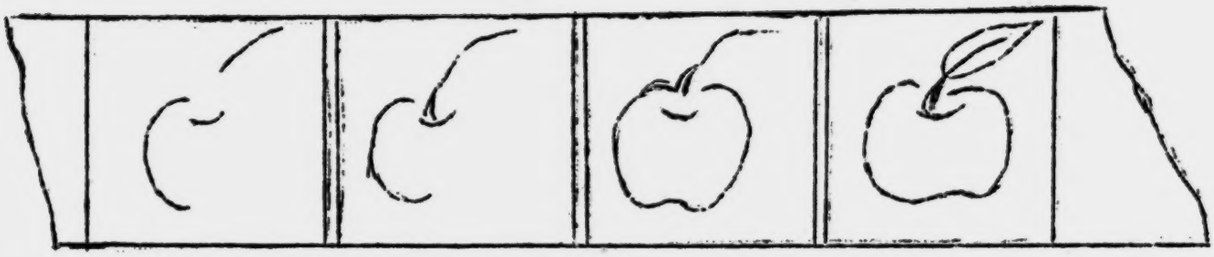
LEARNING TO SEE

"Learning to see" is a term that includes much that has been dealt with in preceding discussion. It is a general categorization that includes figure-ground relationships -- and more. It is that power of the mind which enables one to look at a printed picture and interpret the image meaningfully. It is our ability to recognize a fire hydrant if we see it from a point directly above center in contrast to seeing the hydrant as a vertical form. It is learning to see line and texture relationships in graphic materials. It is learning to "see" green against green against green!

Several resources were developed which fit into this final category. These were experiences through slides, filmstrips, overhead projection transparencies with cards, and visual puzzles.

In any given set of twenty slides used in a presentation one or two of the twenty were likely to involve some problem in perceiving and relating perspective, point of view (as close up), line, texture or color. A city scene might be a view taken from an office building window several stories above street level -- or an object in water may have been photographed from a bridge -- the possibilities are many. The discussions in class groups involved recognition of detail from an unusual point of view, interpretation of space relationships and environmental recognition. Similarly, the point of view might be from a low point looking upwards. A flagpole with flag flying, seen from the bottom of the pole looking upward is a vastly different experience in seeing compared with the stereotyped view of the extended flag waving in a stiff breeze and viewed broadside. Samples of these slides are included in the kit of materials deposited with the U. S. Office of Education.

The filmstrips involved gradual revelation of a common or familiar figure.



Presented frame by frame with new clues added each frame the children were encouraged to guess what the picture was about. If a guess or idea was offered the reasons why this might be true was discussed. In operation, the filmstrips were used either before or after a slide presentation.

A number of the filmstrips were based upon comic strip characters familiar to children such as Bugs Bunny, Smoky the Bear, etc.

Overhead projection transparencies were designed in combination with a set of cards for pupil use. An example: a number of cartoon type faces were drawn. The faces varied in expression, sex, and direction (front, profile). Each face was individually enlarged onto 4 by 5 inch cards which the teacher would distribute to her class. The teacher could vary the experience from simple matching (who has the card that shows this face?) to "Let me see all the cards that show people who are happy." Interplay between the projection of the images and the pupil cards is possible in great variety. This is especially true of experiencing categorization in the learning process.

An extensive series of visual puzzles were developed. These consist of photographs with one or more pieces cut out which the student is expected to replace in the correct orientation to the total picture. The shapes of the cut outs were limited to squares, triangles and variations of these forms (for example a cross). It is then necessary for the student to learn to think of visual relationships graphically presented. This type of exercise should also contribute to environmental awareness, depending upon the content of the graphic.

RESULTS

A variety of response-eliciting materials were developed. The materials were tried out in classes of pre-school, kindergarten and primary level classes.

The materials included overhead projection transparencies,

2 x 2 inch slides in color and black and white, 8mm single concept films, form boards, puzzles and other graphic materials.

DISCUSSION

The project described in this report was to be phase one of what was conceived to be a much broader project ultimately. Materials developed were to be tested using a much broader population. This testing was to be a follow-up project which would be developed cooperatively by the research department of the Pennsylvania Department of Public Instruction and the Cooperative Research branch of the United States Office of Education. About half way through this project there were personnel changes in the Pennsylvania Department of Public Instruction and a little later in the U. S. Office of Education. These changes involved those who were involved in planning the project and who would have been concerned in designing a phase II project. Therefore this report only covers the beginning of a much more broadly conceived program of development and research. In fact, with the moving of Dr. Sidney Archer and Dr. Martin Higgins from the Department of Public Instruction all cooperative effort and communication ended.

A demonstration conference on the project was held in Harrisburg, Pennsylvania, on March 2 and 3, 1966. The consultants present included Department of Public Instruction Research and Curriculum personnel, specialists in elementary education, child development, art education, educational research, anthropology, and media.

On March 3rd a demonstration was staged for this group. A group of first grade level students from the Harrisburg schools were subjects for the demonstration. Following the demonstration the conference attendees met in small group sessions to evaluate the demonstration and to suggest further action and hypothesis for research based upon the materials for learning developed during this project.

Two papers that were submitted to Dr. Sidney Archer, Director of the Bureau of Research, D. P. I., as a result of this conference offer guidelines or directions for consideration in planning hypothesis for follow-up research. Following are excerpts from the paper submitted by Dr. Rosslyn Suchman of Gallaudet College, Washington, D.C.

> "What function do these materials serve? Some of the functions that I felt this material could facilitate are:

a. Improve visual scanning of the external environment thereby increasing data input (which in turn, could facilitate intellectual or creative processes).

b. Motivation to learn, to inquire with these materials appears high. While I dislike the obvious, nonetheless it still needs to be said that the most effective learning occurs where the learner has a positive response to the learning situation.

c. Develop, or liberate (depending on your philosophy) the child's creative capacities by stimulating curiousity, inquiry and divergent thinking.

d. Dr. Duker added that these materials teach verbal skills and my observations of classes of retarded, and young normal, children lead me to agree.

What research direction(s) should be investigated? The materials lend themselves to four major areas:

a. Basic Research

(1) Developmental studies of visual perceptual abilities e.g. age differences in capacity to handle information bits.

(2) Experimental studies of the effects of training with these materials on developmental processes, e.g. do children's eye movement patterns follow a more mature, or differentiated pattern after training with these materials.

b. Educational Research

(1) Do children's abilities in problem-solving, reading, etc. improve in comparison with other methods?

(2) To what extent are change rates affected by manner of presentation, e.g. 'good' and 'bad' teachers, varying sequences of presentation, etc?

c. Personality Research

(1) Do children display more behaviors suggesting creativity, curiousity and inquiry after work with these materials?

(2) Is response to these materials correlated with socio-economic class, sex, race, IQ, locale, child-rearing patterns?

d. Special Education Research

(1) Pilot work with mentally retarded children is underway and shows promise for research.

(2) Culturally deprived children also appear, in pilot work, to respond positively.

(3) Any group of handicapped whose major learning is visual could use parts of these materials. This includes deaf children, brain-damaged and emotionally disturbed children who do not 'hear' what is said to them. Also, visual materials provide a more concrete source of data for more of the organic and emotionally disturbed children than do auditory stimuli."

Dr. Duker in her paper (see Appendix II) suggested that the materials could be used.

1. to teach the child skills by which he could learn to solve self-discovered problems.

2. to help the student to learn to think divergently rather than convergently.

3. to seek more than one strategy for resolving a dilemma.

4. for incorporating the learning experience into a space age perception pattern.

Teachers in the Centennial School District who have had access too and have used the materials are highly supportive of their use. One teacher of slow learners confided, "the children have learned so much this year from these slide programs". Teachers have been impressed with what the discussion reveal about the vocabulary of the children. The responses elicited indicated a much broader vocabulary was possessed by the children than the teachers had believed to be true. The door was thus opened to using a broader range of materials, especially during story reading periods, than might otherwise have been thought feasible.

One teacher of slow learning primary age children said that she did not know how she had managed when she had to teach without the materials (previous years of teaching).

On the basis of such statements coming from well trained professional teachers it is assumed the project was successful in developing response-eliciting materials.

Nearby school districts are using some of the materials and ideas of this project. Abington School District, Abington, Pennsylvania, is using the light table and transparencies. Bristol Township School District, Bristol, Pennsylvania, is using the light table and transparencies. Other districts would like to use the materials if and when they become available.

KINDERGARTEN WORKSHOP

During the week beginning August 15, 1966, a workshop on the materials was held with most of the kindergarten teachers in the Centennial School District. The purpose of the workshop was to explain the materials to these teachers, seek their evaluations, and to invite them to try the materials during the 1966-67 school year.

The teachers were, without exception, enthusiastic about the materials. They expressed the opinion that the materials would contribute significantly to the education of children in our kindergartens. The materials are, as a consequence, being used in the forty-four kindergarten classes operated by Centennial School District.

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Educational experiences can be designed and materials produced which enable children to experience learning more actively.

The need of such experiences and materials has positive support from teachers of normal and teachers of slow learning groups of children.

One implication is a need to consider an addition to the school curriculum which is designed deliberately to help children develop their potential ability to see, to hear, to manipulate, to create, and to express their development. The current heavy emphasis on memorizing information and the limiting of skills development to handwriting, spelling, reading and numbers leaves

little if any time for such matters as learning to see, to hear, to observe and other skills which are important toward self actualization. The humanization of the school experience can hardly become a reality if we do not provide experiences which help children develop as humans.

It is recommended that means be provided whereby the experiences and materials described in this report may be tried out on a broader scale and with greater diversification of pupil subjects. The city child living in slum areas and children living in rural areas which have recently drawn attention because of poor economic conditions may profit considerably from being involved with these or similar materials. The subjects exposed to the materials to date are all living in suburban communities.

SUMMARY

The project, "Instructional Media and Heuristic Learning", was designed to extend a concept of non-textbook learning resources to a degree of adequacy that would permit the identification of hypothesis for research in learning.

The materials developed provide media for learning experiences with rich potential for stimulating creativity, for increasing visual perceptual ability, and for developing a sensitivity or awareness to a broad scope of the components that we label "environment". Many of the materials provide a springboard for language experiences which reveal some of the breadth and depth of the childs personal experience background. They help the child reveal to the teacher many of the "bits" of knowledge he has acquired about the world in which he lives. The transparencies used with the light table provide help toward mastering the visual-motor skills essential to written language and numbers.

The materials are, for the most part, self-motivating. The child is "involved" as he experiences the materials. These are not things or information to be learned --- they are materials to be experienced. There are no right behaviors by which the child may be "graded". A child may express complete rejection of a work of art exposed to him through a slide. Others may enjoy a positive feeling about the same work of art. The child is "himself" during these experiences.

Film loops, overhead projection transparencies, light table transparencies, filmstrips, 2x2 slides and graphic materials in the form of challenging visual puzzles are the means through which heuristic learning experiences have been provided for children during this project.

Research which should follow this project has yet to be designed and carried out.

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APPENDIX I

Dr. N. Sidney Archer
Director of Research Bureau
Department of Public Instruction
Harrisburg, Pennsylvania

In accordance with your request, a summary of critical points, as perceived by me, follows:

1. The materials created by Dr. Ray were reviewed with unanimous enthusiasm.

2. The first major question was what function do these materials serve? Some of the functions that I felt this material could facilitate are:

   a. Improve visual scanning of the external environment thereby increasing data input (which in turn, could facilitate intellectual or creative processes).
   b. Motivation to learn, to inquire with these materials appears high. While I dislike the obvious, nonetheless it still needs to be said that the most effective learning occurs where the learner has a positive response to the learning situation.
   c. Develop, or liberate (depending on your philosophy) the child's creative capacities by stimulating curiousity, inquiry and divergent thinking.
   d. Dr. Duker added that these materials teach verbal skills and my observations of classes of retarded, and young normal, children lead me to agree.

3. The second major question was what research direction(s) should be investigated. The materials lend themselves to four major areas:

   a. Basic Research
      (1) Developmental studies of visual perceptual abilities e.g. age differences in capacity to handle information bits.
      (2) Experimental studies of the effects of training with these materials on developmental processes, e.g. do children's eye movement patterns follow a more mature, or differentiated pattern after training with these materials.

b. Educational Research
   (1) Do children's abilities in problem-solving, reading, etc. improve in comparison with other methods?
   (2) To what extent are change rates affected by manner of presentation e.g. "good" and "bad" teachers, varying sequences of presentation, etc?

c. Personality Research
   (1) Do children display more behaviors suggesting creativity, curiousity and inquiry after work with these materials?
   (2) Is response to these materials correlated with socio-economic class, sex, race, IQ, locale, child-rearing patterns?

d. Special Education Research
   (1) Pilot work with mentally retarded children is underway and shows promise for research.
   (2) Culturally deprived children also appear, in pilot work, to respond positively.
   (3) Any group of handicapped whose major learning is visual could use parts of these materials. This includes deaf children, brain-damaged and emotionally disturbed children who do not "hear" what is said to them. Also, visual materials provide a more concrete source of data for more of the organic and emotionally disturbed children than do auditory stimuli.
   (4) The last area is methodological issues.
      (a) Points of view ranged from the opinion that ordering Dr. Ray's materials would in some fashion destroy their meaningfulness to the feeling that unless the materials were ordered, categorized and some attempt was made to make a continum (based on grades, perceptual variables or IQ etc.) within the variety of materials, meaningful research would not be possible.
      (b) The question of judges vs. experimental designs (using controls, posttests, etc.) was another issue. One suggestion was to make simultaneous sound films of all the classroom subjects and the teacher so that all behaviors could be evaluated and analyzed from primary data.

Obviously, there is much potential in these materials--now

the trick is to decide which question you want to ask, how you want to ask it, and of whom.

I hope this summary has use for you. Thank you again for inviting me.

Sincerely yours,

Rosslyn Gaines Suchman
Associate Research
Professor

APPENDIX II

To: Dr. N. Sidney Archer, Director - Bureau of Research
From:= Dr. Laura Thompson Duker, 3215 Avenue H, Apt. 11L,
Brooklyn, New York
Re: Harrisburg Meeting - To reinforce the report on the discussion of Small Group No. 1, I send the following thoughts and suggestions regarding the meaning and use of Dr. Henry Ray's materials on visual instruction.

Our ignorance of the school child's world:

The children now attending elementary school are from one to three generations separated from their teachers and from the administrators of their schools. They are also far removed from those doing research and consultant work for the educational establishment, either at the local, state, or federal level. They are so far removed in the direction of the future from even the youngest of us that, in my opinion, we cannot really know their present world either by experience or imagination.

We talk about the space age but these children were born into it and they are living in it. None of us can predict the culture of the world in which they will live as adults. Nor can we foresee the practical living problems in which they as adults will be involved even though we may have some inkling of them on the basis of presently available evidence. In this rapidly changing era we do have the means of concluding, however, that the adult world of our present school children will be very different from our own.

Decision-making tools needed to cope with the world of the future:

We are accustomed to thinking about these changes in terms of technological developments, especially the use of computers, new methods of communication on a worldwide scale, explorations into outer space, etc. It is more difficult for us to appreciate the cultural implications of such technological developments and the kinds of practical problems which they will engender requiring solutions to be made by both individuals and social groups. It is not difficult to surmise, however, that to reach adequate solutions to these problems will require resources and decision-making tools with which most present-day American school children are not being equipped.

It would seem, therefore, that one of the relevant areas of problems to be considered by forward-looking educational planning groups concerns decision-making during the next half

century. We need to try to pinpoint relevant practical problems about which decisions will have to be made by the people of the world, and especially by Americans who will be living their youthful and mature years during the next half century. What tools are available which might help growing children to develop a readiness to cope with these living problems?

Discovering problems and solving them:

A relevant suggestion made in this regard by members of Group 1 was that the child might be taught skills by which he could learn to solve self-discovered problems. The question arose: How could the teacher set up a situation wherein a child would discover a problem and then go about finding a solution or a series of alternate solutions to the self-discovered problem? Having reached this point he would be in a position to make a choice of the most effective solution in terms of the total problem situation, either at the time or at a later date.

A forward-looking mental approach:

At least the child would be developing a mental approach, it was argued, which would allow him to entertain the possibility that there might be several alternate solutions to a single problem. And he might also be influenced to move to a position in his thinking from which he could entertain the idea that several or all of these potential solutions might be correct simultaneously.

Such a position would allow him to move forward into the future on a firmer conceptual basis from the viewpoint of modern science, especially physical science, and burdened with less anxiety, than the traditional one.

Weakness of the traditional approach:

According to the traditional American stereotype, we tend to assume that a person in a dilemma is faced with two alternatives, one "good" and the other "evil." The person's strategy of decision is therefore to find the "good" alternative and choose it. The impracticality--indeed, the danger--of this traditional two-way approach toward problem-solving is so apparent as to hardly need illustration. We all recognize the stereo-type. A good example of the pattern operating on the national level concerns our behavior in regard to the whole Vietnam problem. We feel that something is not quite as it should be regarding what we are doing there, but our response to the dilemma is simply to do more of the same.

Suggestions regarding the use of Dr. Ray's Materials:

A cursory view of Dr. Henry Ray's instructional media in action will reveal many kinds of materials which may be used to set up an instructional situation wherein the student may be stimulated to discover a problem. Our group offered several practical suggestions as to how some of the materials might be used, or modified, to help the student "to learn to think divergently rather than convergently," as one member put it, and to "seek more than one strategy" for resolving a dilemma. These suggestions will be found, I presume, in the detailed reports of the observers and trainees in Group 1. I call attention here especially to the idea that the children be given more chance to manipulate the materials themselves, to produce the media of instruction themselves, and to extend themselves by means of, and through, the media.

Also ways may be found to "delay verbal categorization of perceived images" and to organize the learning situation so that the child will realize that unstructured materials may appear to take many images and that such images need not be static or rigidly bounded but rather may be constantly in flux.

In other words, as one member of the Group put it, we need to produce materials which will draw out of the learner alternative courses of action, or different strategies. We need to code cues to different but equally relevant images. The suggestion was made that the teacher might guide the student along a line of development where his expectancies would be reinforced and then "drop him" so to speak--or at least encourage him to proceed by means of his own decision in view of several alternatives. Examples of modern art works which were projected on the screen by Dr. Ray might be used for this purpose.

Self-development of new solutions to problems:

This emphasis on decision-making in the face of several relevant alternative solutions to a problem will readily be seen as a step in the direction of increasing the child's consciousness of choice in a complex and rapidly changing world; indeed, in the space world of which he is a part. It should also lay a foundation for his self-development of new solutions or newly structured solutions of traditional materials.

Problem-oriented versus task-oriented teaching:

It would also allow the teacher to move from a focus on "task-oriented" teaching to "problem-oriented" teaching. Such a shift would have the great advantage of helping to

equip the child for an unknown but rapidly changing future world. In this future world we know that, if a person is to subsist and fulfill himself as a human being and a member of society in which he is expected to play many different roles in different contexts, the individual will have to recognize problems involving decisions which he must make and he will have to make them within situational context on the basis of tools available to him.

Preparing to live confidently with uncertainty:

Such an ordering of the materials should help him to live with uncertainty in confidence and avoid the false security of stereo-typed but outmoded responses to new situations. It should tend to strengthen rather than weaken the child's developing ego, but not at the expense of his peers or other members of society. His strength should tend to develop from within, to meet newly emerging tasks which cannot now be foreseen, by using his own resources including his educational experiences and his hereditary endowment.

Incorporating the learning experience into a space age perception pattern:

Such an orientation of Dr. Ray's materials, I believe, would also tend to utilize their ego-enhancing propensities to the full so that the child's learning experience with those materials would be fun and stimulate for the moment but much more. It could also be incorporated into the child's developing pattern of perception of his changing world. It could be used in developing functional categories for perceived images to be stored in his mind as concepts and thus be used to bring his concepts more in line with tomorrow's realities. This equipment would help him to fulfill himself as a member of his community and his nation in the space-age world. Thus the individual would tend to view his world more realistically in terms of the problems it poses to him as a person. It should help him to become a flexible, emotionally healthy and creative member of society. It should lessen the danger of his being overwhelmed by the complexities and novelties of tomorrow's world and of his taking refuge in an anti-social avenue of escape to become a social liability.

Footnotes

1. I have discussed this problem in Toward a Science of Mankind, Thompson, Laura, McGraw Hill, New York, 1961, p. 79.
2. Ibid., pp. 82 and 83.
3. This point is being amplified in The Nature of Culture, Thompson, Laura, Random House, New York (in preparation).

APPENDIX III

Slides:

1. Antique Shop
2. Zebra
3. SpeedLimit Sign
4. Fireplace
5. Wood Carver
6. Marching Band
7. Ship
8. Doorframe
9. Plowing Snow
10. Easter Bunnies
11. Farm
12. Shopping Cart
13. Building Wreckers
14. Hive
15. Farmer
16. Monkey Wheel
17. Ostrich
18. Feeding Cattle
19. Water Tower
20. Ghost
21. Modern Art
22. Bridges

23. Rock Litter

24. Pilgrims

25. Country Lane

26. Wigwam

27. Halloween

28. Student

29. Turnpike

30. Horse-Deer Statue

31. Fisherman

32. Steel Pier

33. Polar Bears

34. Firemen

35. Sleeper on Park Bench

36. Beaver Splashing

37. Cactus

38. Aerial - Highway

39. Birds in Tree

40. Japanese Scene

41. Flag on Pole (W.A.)

42. Dinnerware

43. Saddle

44. Devil Mask

45. Digger

46. City Bridge

47. Monkeys on Wall

48. Halloween Bulletin Board

49. Painting - Vanishing Point

50. Birds in Tree

51. Sign - Telephone

52. Deer in Woods

53. Paper Cup

54. Night Signs

55. Abandoned Spring House

56. Butterfly

57. Indian & Wigwam

58. Bathers

59. Bridge

60. Mask

61. Lion Statue

62. Manhole Cover

63. Bear on Rock

64. Cup

65. Leaves

66. Painting

67. Circular Walkway

68. City - Umbrellas

69. Bench - Writing

70. Construction Scene

71. Station

72. Tree

73. SeaLion

74. Town Corner

75. Ceramic Birds

76. El Station

77. Bull

78. Night Corner

79. Balloons

80. Fire Rings

81. Fire Engine

82. Sun Reflection

83. Shadow - Flag

84. Sculpture - Hand & Arm

85. Smoke

86. Cat Hunting

87. Polar Bear

88. Ceramic Bird

89. Ferris Wheel

90. Cat Sitting

91. Pottery

92. Night Scene

93. IBM Worker

94. Fish on Wall

95. School Children

96. Intersection

97. Tree

98. Double Slide

99. Horse & Deer

100. Fire Engine

101. Lake Reflection

102. Leaves

103. "Indian" Camp

104. Dog

105. Tank

106. Hippo

107. Washington Monument

108. Junk

109. Oil Wells

110. Butterfly

111. Rain Drops

112. Cocoa Inn

113. Train Tracks

114. Docks

115. Frosty Leaves

116. Leaves

117. Crowd

118. Mask

119. Grapes

120. Artist

121. Bridge

122. Building Blocks

123. Leaves

124. Horse Head

125. Fire w/Engine

126. Fork

127. Peacock

128. Rose

129. Colors

130. Birds

131. Tents from Air

132. Street Scene

133. Fountain

134. Classroom (A.V.)

135. Worms

136. Rug

137. Tiger Lady

138. Cards

139. Lane

140. Dinosaur

141. Alligator

142. Leaves

143. Deer

144. Tomato Truck

145. Crowd at Fair

146. Parrot Drinking

147. Burning Leaves

148. Night Lights

149. Japanese Scene

150. Mirrors

151. Pottery Cats

152. City Smog

153. Leaves

154. Totem Pole

155. Caged Tiger

156. Painting - Non-Objective

157. Dali - Painting Detail (Persistence of Memory)

158. Drawing - Henry Moore

159. Silhouette

160. Black & White Horses

161. Fountain Statue - Fireman

162. Panel Art - Farm Animals

163. Segal - Bus Driver

164. See No Evil - Speak No Evil - Hear No Evil

165. Chagall - Painting

166. Painting - Man

167. People w/Bags on Heads

168. Woman & Rooster

169. Quilt Pattern

170. Bridge

171. Night Reflections

172. Clock Face

173. Parrots

174. Courtyard

175. Shells on Beach

176. Wall W/Fountains

177. Tire Track

178. Airplane

179. Winter Scene

180. Sunset

181. Street Scene

182. Parrots on Wire

183 Boy in Blizzard

184. Ceramics

185. Statue

186. Airplane

187. House in Snow

[illegible] Crab

189. Ceramics

190. Pigeon

191. Vine on Wall

192. Ducks

193. Beach-Weed

194. Dog

195. Xmas Decorations

196. Church

197. Airplane

198. Airplane

199. Lightbulb (Xmas Tree)

200. Stones & Shell on Beach

Filmstrips:

1. Porky Pig with Hat
2. Elmer Fudd
3. Bugs Bunny - Fireman
4. Porky Pig - Painter
5. Bugs Bunny - Carpenter
6. Bugs Bunny & Elmer Fudd - Haircut
7. Porky & Patricia Pig - Picnic
8. Porky & Patricia Pig - School
9. Fair Exit
10. Peanut Salesman
11. Ice Cream Salesman
12. Identification

Transparencies:

1. Ten Cows with Spots - figure-ground
2. Deer in Shrubbery - figure-ground
3. Oak Leaf - figure-ground
4. #1 - Merry-go-Round - language stimulator
5. #2 - Merry-go-Round - language stimulator
6. Dog & Robin - language stimulator
7. Figure & Words - language experience

8. Chinese Writing - Shape descrimination

9. Country Store - environmental awareness

10. Ducks in Pond - number & form concept

11. Children & Fairies - imagination stimulator

12. Two Sailors on Bow Sprit - dialogue stimulator

13. Children with Musical Instruments - fantasy stimulator

14. Spotted Dog

15. Baseball Player

16. Silhouette (outdoor scene)

Puzzles:

1. #131 - Used Car Lot

2. # 23 - Dog

3. #158 - Old House

4. # 12 - Fire Plug

5. #156 - Garage & Car

6. #151 - Cars Parked on Street

7. #149 - Camp

8. #113 - Excavation

9. # 33 - Winter Trees

10. # 67 - Fir Trees

11. # 15 - Cereal Box Display

12. # 50 - Boiler Room

5 Sets Transparencies with Pupil Cards for visual scanning, shape perception, shape matching, categorization experience:

1. "L" Shapes - Geometric Figures w/Objects
2. Reading Experience - Word Perception
3. Objects - Word Matching
4. Figures & Objects - Image Matching & Categorization
5. Faces - Categorization

8MM Film Cartridges:

1. Chicken w/Chicks
2. Apes
3. Gulls
4. Malamute
5. Turtle
6. Polar Bear
7. Rhino
8. Elephant
9. Beach Scene
10. Ferry Boats

Transparencies for Light Table:

1. Kite
2. Horse
3. Dog
4. Camel
5. Stars - Sun - Moon
6. Triangles & Squares
7. Straight Lines - "+" & "x"
8. Curved Lines - "o" & "s"
9. Bird
10. Numbers

Two Form Boards

APPENDIX IV

Consultants for the Project are listed below:

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